

IN THE CLAIMS

This listing of claims replaces all prior versions and listing of claims in the application:

1. (currently amended) A single mode tunable laser operable over a range of wavelengths comprising a laser source for providing light with a single wavelength selected from the range of wavelengths, a diffractive element spaced from the laser source for redirecting the light received from the laser source, a reflective element spaced from the diffractive element for receiving the light redirected by the diffractive element and for further redirecting the light back to the diffractive element, the diffractive element receiving the light further redirected by the reflective element and returning the light to the laser source whereby the laser source, the diffractive element and the reflective element cause the light to lase at the wavelength, and at least one microactuator coupled to one of the diffractive element and the reflective element for causing angular movement of such element to permit selection of the single wavelength of the light from the range of wavelengths, the laser source, the diffractive element, the reflective element and the at least one microactuator being part of a tunable laser assembly having a length ranging from 5 to 25 millimeters, a width ranging from 4 to 15 millimeters and a height ranging from 3 to 10 millimeters.

2. (previously presented) The tunable laser of Claim 1 wherein the light travels from the laser source to the diffractive element and then to the reflective element along an optical path length and wherein the wavelength has a half wavelength and can be selected from the range of wavelengths, the at least one microactuator moving said one of the diffractive element and the reflective element so that the optical path length equals an integer number of half wavelengths of the selected wavelength.

3. (original) The tunable laser of Claim 2 wherein the range of wavelengths extends from approximately 1520 nanometers to approximately 1560 nanometers.

4. (original) The tunable laser of Claim 1 wherein the selected wavelength is 1540 nanometers.

5. (previously presented) The tunable laser of Claim 1 wherein the at least one microactuator includes a microactuator coupled to the reflective element for causing angular movement of the reflective element.

6. (original) The tunable laser of Claim 1 wherein the at least one microactuator includes a microactuator coupled to the reflective element for rotating the reflective element about a pivot point.

7. (original) The tunable laser of Claim 6 wherein the pivot point is spaced apart from the microactuator.

8. (previously presented) The tunable laser of Claim 6 further comprising means for translating the reflective element relative to the diffractive element.

9. (original) The tunable laser of Claim 1 wherein the at least one microactuator includes a first microactuator coupled to the reflective element for rotating the reflective element about a pivot point and a second microactuator coupled to the reflective element for translating the reflective element relative to the diffractive element.

10. (original) The tunable laser of Claim 1 wherein the at least one microactuator includes a micromachined actuator.

11. (original) The tunable laser of Claim 1 wherein the at least one microactuator is an electrostatic microactuator having interdigitatable comb fingers.

12. (previously presented) The tunable laser of Claim 11 further comprising a controller for measuring the capacitance between the interdigitatable comb fingers and providing a drive signal to the at least one microactuator in response to the measured capacitance.

13. (previously presented) A tunable laser comprising a laser source for providing light with a wavelength selected from a range of wavelengths, a diffractive element spaced from the laser source for redirecting the light received from the laser source, a reflective element spaced from the diffractive element for receiving the light redirected by the diffractive element and for further redirecting the light back to the diffractive element, the diffractive element receiving the light further redirected by the reflective element and returning the light to the laser source whereby the laser source, the diffractive element and the reflective element cause the light to lase at the wavelength, at least one microactuator coupled to one of the diffractive element and the reflective element for moving such element to select the wavelength of the light and a counterbalance coupled to the at least one microactuator and the one of the diffractive element and the reflective element for inhibiting undesirable movement of the one of the diffractive

element and the reflective element in response to externally applied accelerations to the tunable laser.

14. (original) The tunable laser of Claim 1 wherein the reflective element includes a retroreflector.

15. (original) The tunable laser of Claim 1 wherein the laser source includes a Fabry-Perot laser.

16. (original) The tunable laser of Claim 1 further comprising an optical sensor for sensing a light beam reflected from one of the diffractive element and the reflective element so as to measure the wavelength of the light and producing an error signal corresponding to any deviation between the measured wavelength and the selected wavelength and a controller electrically coupled to the optical sensor and the at least one microactuator for receiving the error signal and providing a control signal to the at least one microactuator in response to the error signal.

17. (original) The tunable laser of Claim 16 wherein the optical sensor is a position sensing device.

18. (original) The tunable laser or Claim 17 further comprising an additional laser source for supplying the light beam.

19. (original) The tunable laser of Claim 17 wherein the light beam is supplied by the laser source.

20. (original) The tunable laser of Claim 16 wherein the optical sensor is a wavelength locker.

21. (original) The tunable laser of Claim 1 further comprising an optical sensor for sensing the light so as to measure the wavelength of the light and producing an error signal corresponding to any deviation between the measured wavelength and the selected wavelength and a controller electrically coupled to the optical sensor and the at least one microactuator for receiving the error signal and providing a control signal to the at least one microactuator in response to the error signal.

22. (original) The tunable laser of Claim 21 wherein the optical sensor is selected from the group consisting of a position sensing device and a wavelength locker.

23. (original) The tunable laser of Claim 1 further comprising a collimating lens disposed between the laser source and the diffractive element and an additional microactuator coupled to the collimating lens for moving the collimating lens to enhance the return of the light to the laser source.

24. (original) The tunable laser of Claim 23 wherein the additional microactuator is an electrostatic microactuator.

25. (original) The tunable laser of Claim 23 further comprising a counterbalance coupled to the collimating lens and the additional microactuator for inhibiting undesirable movement of the collimating lens in response to externally applied accelerations to the collimating lens.

26. (original) The tunable laser of Claim 1 further comprising an electroabsorptive modulator disposed in the optical path.

27. (original) The tunable laser of Claim 26 wherein the electroabsorptive modulator is disposed between the laser source and the diffractive element.

28. (currently amended) A tunable laser microassembly comprising a laser source for providing light with a wavelength selected from a range of wavelengths, a diffractive element spaced from the laser source for redirecting the light received from the laser source, a reflective element spaced from the diffractive element for receiving the light redirected by the diffractive element and for further redirecting the light back to the diffractive element, the diffractive element receiving the light further redirected by the reflective element and returning the light to the laser source whereby the laser source, the diffractive element and the reflective element cause the light to lase at the wavelength, and a ~~rotatable micromechanical~~micro-dimensioned actuator coupled to one of the diffractive element and the reflective element for rotating such element to select the wavelength of the light.

29. (previously presented) The tunable laser of Claim 28 wherein the micromechanical actuator includes a rotatable micromechanical actuator coupled to one of the diffractive element and the reflective element for rotating and translating such element.

30. (previously presented) The tunable laser of Claim 29 further comprising an additional microactuator coupled to such element for translating such element.

31. (currently amended) A tunable-laser assembly comprising a laser source for providing light along an optical path with a wavelength selected from a range of wavelengths, a diffractive element positioned in the optical path and spaced from the laser source for redirecting the light received from the laser source, a reflective element positioned in the optical path and spaced from the diffractive element for receiving the light redirected by the diffractive element and for further redirecting the light back along the optical path to the diffractive element, the diffractive element receiving the light further redirected by the reflective element and returning the light along the optical path to the laser source whereby adjustment of the optical path created by the laser source, the diffractive element and the reflective element causes the light to lase at a selected wavelength, a collimating lens disposed between the laser source and the diffractive element and a microactuator coupled to the collimating lens for moving the collimating lens to enhance the returnpermit enhanced coupling of the light tointo the laser source.

32. (currently amended) The tunable-laser assembly of Claim 31 wherein the microactuator is an electrostatic microactuator.

33. (currently amended) The tunable-laser assembly of Claim 31 further comprising counterbalancing means coupled to the microactuator and to the collimating lens for inhibiting undesirable movement of the collimating lens in response to externally applied accelerations to the tunable laser.

34. (currently amended) The tunable-laser assembly of Claim 31 further comprising a power detector for monitoring the power of the light and a controller electrically coupled to the power detector and the microactuator for providing a control signal to the microactuator for moving the collimating lens to enhance coupling of the light into the laser source and thus increase the power of the light.

35. (previously presented) The tunable laser of Claim 13 wherein the at least one microactuator includes a microactuator coupled to the reflective element for rotating the reflective element about a pivot point.

36. (previously presented) The tunable laser of Claim 35 wherein the pivot point is spaced apart from the microactuator.

37. (currently amended) A tunable laser comprising a laser source for providing light with a wavelength selected from a range of wavelengths, a diffractive element spaced from the laser source for redirecting the light received from the laser source, a reflective element spaced from the diffractive element for receiving the light redirected by the diffractive element and for further redirecting the light back to the diffractive element, the diffractive element receiving the light further redirected by the reflective element and returning the light to the laser source whereby the laser source, the diffractive element and the reflective element cause the light to lase at the wavelength, and a rotatable electrostatic microactuator having a movable structure extending substantially in a plane and coupled to the reflective element for rotating the reflective element about a pivot point spaced apart from the microactuator ~~extending substantially perpendicular to the plane~~ to select the wavelength of the light.

38. (previously presented) The tunable laser of Claim 37 further comprising a collimating lens disposed between the laser source and the diffractive element.

39. (previously presented) The tunable laser of Claim 37 further comprising a counterbalance coupled to the microactuator and the reflective element for inhibiting undesirable movement of the reflective element in response to externally applied accelerations to the reflective element.

40. (new) The tunable laser of Claim 37 wherein the pivot point is spaced apart from and free of the movable structure.

## REMARKS

Applicants thank the Examiner for the courtesy of a telephonic interview on August 9, 2004 during which a draft Amendment that was faxed to the Examiner on August 5, 2004 was discussed. More specifically, Applicants discussed with the Examiner the edited photograph in Exhibit A of the draft Amendment, which appears in Exhibit A hereof, in which a photograph of a Burleigh Inchworm stepper motor has been inserted into a photograph of a tunable laser having an actuator of the type called for in certain of the claims. Applicants emphasized that Applicants' actuator is very small in size in comparison to the Burleigh Inchworm stepper motor, and can be referred to as a micro-dimensioned actuator, as in some claims herein, or a micro-machined actuator, as in other claims herein. Applicants agreed to include a definition of the word "micro-machined," as that word is known to those skilled in the art. Applicants further pointed out the dimensional limitations of the tunable laser assembly in Claim 1 and the rotatable electrostatic microactuator in Claim 37, each of which Applicants submitted was not disclosed by the cited references.

Applicants acknowledge that Claims 13, 35 and 36 have been allowed and that Claims 23-25 and 39 have been rejected as being dependent upon a rejected base claim, but indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim. Claim 31 has been stated to be allowable if rewritten to overcome the rejection under 35 U.S.C. §112, second paragraph, set forth below.

Claims 31-34 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, it is stated that Claim 31 omits essential elements and that it is not clear from the language of Claim 34 how the movement of the lens increases the power of light. In this regard, Claim 31 and Claims 32-34 depending therefrom have been amended to omit the word "tunable" objected to by the Examiner and now call for a laser assembly. In addition, Claim 31 has been amended to now state that the microactuator is coupled to the collimating lens for moving the collimating lens to permit enhanced coupling of the light into the laser source and Claim 34 has been amended to now call of a power detector for monitoring the power of the light and a controller electrically coupled to the power detector and the microactuator for providing a control signal to the microactuator for moving the collimating

lens to enhance coupling of the light into the laser source and thus increase the power of the light. With these explanations and amendments, it is assumed that the rejection under 35 U.S.C. §112, second paragraph, will be withdrawn. It is further assumed that Claim 31, further to the statements of the Examiner recited above, is now allowable.

Claims 1-10, 14, 15, 18, 28-30, 37 and 38 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Wu et al. (U.S. Patent No. 6,493,365) in view of McIntyre (U.S. Patent No. 5,319,257). Claims 11 and 12 have been similarly rejected over Wu et al. in view of McIntyre, as applied to Claim 1 above, and further in view of Jerman et al. (U.S. Patent No. 5,998,906), while Claims 16, 17 and 19-22 have been similarly rejected over Wu et al. in view of McIntyre as applied to Claim 1 above, and further in view of Mattori et al. (U.S. Patent No. 6,081,539), Claims 26 and 27 have been similarly rejected over Wu et al. in view of McIntyre as applied to Claim 1 above, and further in view of Broutin et al. (U.S. Patent No. 6,198,757) and Claims 31, 32 and 34 have been similarly rejected as being unpatentable over Lang et al. (U.S. Patent No. 5,771,252) in view of Abe (U.S. Patent No. 6,252,897). Reconsideration of these claims is respectfully requested.

The disclosures of Wu et al., McIntyre and Lang et al. have been summarized in previous amendments.

Newly cited Abe discloses in FIG. 1 an explanatory diagram showing a constitution of the external mirror type wavelength tunable laser according to the embodiment of the invention wherein non-reflection coating is applied to one end plane 11 of a semiconductor laser 1, whereby each reflection factor of input light and output light is reduced in the end plane 11. The light outputted from the semiconductor laser 1 is converted into parallel light by means of a lens 2 either focal point of which is placed so as to face the end plane 11 of the semiconductor laser 1. The lens 2 is movable in a plane orthogonal to a direction of laser beam (light axis) outputted from the end plane 11 of the semiconductor laser 1. When a position of the lens 2 is changed, Abe states that the direction of laser beam outputted from the end plane 11 can be varied. For example, when the lens 2 has been shifted up to a position represented by the broken line in FIG. 1 as a result of transferring the lens 2 along the direction represented by arrow D in the figure, an outputting direction of light changes with an angle  $\theta$  shown in FIG. 1. Col. 2, lines 43-61. The grating type reflector 3 functions to separate spatially the laser beam which was  $\lambda$  outputted from

the end plane 11 of the semiconductor laser 1 and has been converted into parallel light by means of the lens 2 in each wavelength. Thus, the wavelengths satisfying the resonating condition required by the resonator are restricted, so that laser beam of prescribed wavelengths can be obtained. Col. 3, lines 10-16.

The Examiner's reliance on MPEP Section 2144.04(IV) and Gardner v TEC Systems, Inc., et al. is improper. The Examiner states that in Gardner the Federal Court held, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. However, the facts of Gardner are quite different than the instant situation in that the structure of the patentee's device in Gardner was substantially identical to the structure of the cited reference except for certain dimensional limitations included in the patentee's claim. In the instant situation, Applicants have not merely scaled down structure found in one reference. Specifically, Applicants have not merely scaled down the actuator 370 disclosed in Wu et al., nor has the Examiner suggested that the actuator of Wu et al. could be scaled down to a microactuator. Instead, the Examiner relies on McIntyre as disclosing a microactuator. The inability of the actuator 370 of Wu et al. to be scaled down to a microactuator invalidates the Examiner's reliance on MPEP Section 2144.04(IV) and Gardner.

Amended Claim 1 is patentable by calling for a single mode tunable laser of the type set forth therein in which, among other things, the laser source, the diffractive element, the reflective element and the at least one microactuator are part of a tunable laser assembly having a length ranging from 5 to 25 millimeters, a width ranging from 4 to 15 millimeters and a height ranging from 3 to 10 millimeters. Neither Wu et al. nor McIntyre disclose a tunable laser assembly of the dimensions called for in Claim 1. For example, McIntyre compares a typical output profile for the commercially available Burleigh Inchworm stepper motor with his microactuator. As noted in the Amendment filed December 19, 2003, the dimensions of such an Inchworm motor taken alone, that is without the other elements of the tunable laser assembly called for in Claim 1, are significantly larger than the dimensions of the tunable laser assembly of Claim 1. To further illustrate the significant differences in size, attached as Exhibit A is a photograph of a Burleigh Inchworm stepper motor that, as stated above, has been inserted into a photograph of a tunable

laser of the type called for in Claim 1. It is clear from Exhibit A that the actuator of McIntyre would not be suitable in the tunable laser of Claim 1.

Claims 2-12 and 14-27 depend from Claim 1 and are patentable for the same reasons as Claim 1 and by reason of the additional limitations called for therein. For example, Claim 9 is additionally patentable by providing that the at least one microactuator includes a first microactuator coupled to the reflective element for rotating the reflective element about a pivot point and a second microactuator coupled to the reflective element for translating the reflective element relative to the diffractive element. Claim 10 is additionally patentable by providing that the at least one microactuator includes a micromachined actuator. As used herein, the word “micromachined,” as known to those skilled in the art, means a part fabricated through a sequence of processing steps which result in a monolithic or integrated device. The additional limitations of Claims 9 and 10 are not suggested or disclosed by the prior art.

Claim 11 is additionally patentable by providing that the at least one microactuator is an electrostatic microactuator having interdigitatable comb fingers. Contrary to the assertion of the Examiner, there is no suggestion or disclosure in Jerman et al. that an electrostatic microactuator having interdigitable comb fingers as disclosed therein would be suitable for use in a relatively large piezoelectric driven actuator of the type disclosed in McIntyre, let alone in a tunable laser of the type called for in Claim 1. In this regard, an actuator with interdigitable comb fingers is electrostatically driven, while the actuator of McIntyre is piezoelectrically driven. Such principles of operation are quite different and do not permit, as appears to be suggested by the Examiner, a comb driven actuator to be substituted into a piezoelectric actuator to provide a workable device. There is further no suggestion in Jerman et al. that the microactuator thereof would be suitable for use in a tunable laser, particularly of the type called for in Claim 1.

In attempting to combine the disparate disclosures of Wu et al., McIntyre and Jerman et al. in an obviousness rejection of any of the claims herein, the Examiner appears to be using impermissible “hindsight” reasoning. The United States Supreme Court has frequently warned against the use of “hindsight” in determining obviousness. See, for example, Diamond Rubber Co. v. Consolidated Rubber Tire Co., 220 U.S. 428 (1911), where the court stated:

“Knowledge after the event is always easy, and problems once solved present no difficulties, indeed, may be represented as never having

had any, and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skillful attention. But the law has other tests of the invention than subtle conjectures of what might have been seen and yet was not. It regards a change as evidence of novelty, the acceptance and utility of change as further evidence, even as demonstration . . . Nor does it detract from its merit that it is the result of experiment and not the instant and perfect product of inventive power. A patentee may be baldly empirical, seeing nothing beyond his experiments and the result; yet if he has added a new and valuable article to the world's utilities, he is entitled to the rank and protection of an inventor . . . It is certainly not necessary that he understand or be able to state the scientific principles underlying his invention, and it is immaterial whether he can stand a successful examination as to the speculative ideas involved."

Examples of the numerous lower court decisions criticizing the improper use of hindsight include: *Crown Operations International, Ltd. v. Solutia Inc.*, 289 F.3d 1367, 1376, 62 USPQ2d 1917 (Fed. Cir. 2002) ("`Determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.' ATD Corp. v. Lydall, Inc., 159 F.3d 534, 546, 48 USPQ2d 1321, 1329 (Fed. Cir. 1998)."); *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1351, 60 USPQ2d 1001 (Fed. Cir. 2001) ("`The genius of invention is often a combination of known elements which in hindsight seems preordained. To prevent hindsight invalidation of patent claims, the law requires some `teaching, suggestion or reason' to combine cited references.'"); and *Yamanouchi Pharmaceutical Co., Ltd. v. Danbury Pharmacal, Inc.*, 231 F.3d 1339, 1345, 56 USPQ2d 1641, 1645 (Fed. Cir. 2000) ("`as the district court aptly concluded, this case `has all the earmarks of somebody looking at this from hindsight.'").

Amended Claim 28 is patentable by calling for a tunable laser microassembly comprising a laser source for providing light with a wavelength selected from a range of wavelengths, a micro-dimensioned diffractive element spaced from the laser source for redirecting the light received from the laser source, a micro-dimensioned reflective element spaced from the diffractive element for receiving the light redirected by the diffractive element and for further redirecting the light back to the diffractive element, the diffractive element receiving the light further redirected by the reflective element and returning the light to the laser source whereby the

laser source, the diffractive element and the reflective element cause the light to lase at the wavelength, and a micro-dimensioned actuator coupled to one of the diffractive element and the reflective element for rotating such element to select the wavelength of the light.

As used in the claims, the word “micro-dimensioned” means a part that is composed of a majority of individual elements with minimum sizes of micron dimensions and of aggregate size which can be as large as millimeters in dimension.

Wu et al. does not disclose a tunable single mode laser microassembly, let alone such a microassembly having a micro-dimensioned actuator. Nor does McIntyre disclose a micro-dimensioned actuator, or suggest that such a component should be combined into a tunable single mode laser microassembly of the type called for in Claim 28.

Regardless of the Examiner’s assertion that McIntyre discloses a microactuator, McIntyre does not disclose a micro-dimensioned actuator as called for in amended Claim 28. As stated above, McIntyre compares its actuator to a Burleigh Inchworm stepper motor, which from the dimensions previously noted by Applicants is certainly not micro-dimensioned. Applicants have further noted from FIG. 3 of McIntyre that the actuator thereof appears to utilize conventional screws. The sizing of such screws is not consistent with a micro-dimensioned actuator. Referring again to the edited photograph of Exhibit A, the micro-dimensioned actuator of such microassembly shown in Exhibit A is the black portion of the microassembly. As can be seen from Exhibit A, the Burleigh Inchworm stepper motor illustrated therein, and hence the microactuator disclosed in McIntyre, are not micro-dimensioned actuators as called for in Claim 28.

Claims 29-30 depend from Claim 28 and are patentable for the same reasons as Claim 28.

Claim 31 is patentable by calling for a laser assembly of the type set forth therein having, among other things, a collimating lens disposed between the laser source and the diffractive element and a microactuator coupled to the collimating lens for moving the collimating lens to permit enhanced coupling of the light into the laser source. Although stating, as noted above, that Claim 31 would be allowable if rewritten to overcome the rejection under 35 U.S.C. §112, second paragraph, the Examiner states elsewhere in the Action that Claim 31 is unpatentable

over Lang et al. in view of Abe, but is silent as to how the disclosures of Lang et al. and Abe can be combined to render Claim 31 obvious to a person having ordinary skill in the art.

Lang et al. discloses an external cavity, continuously tunable wavelength source. As noted above, Abe discloses an external mirror type wavelength tunable laser which changes the angle of the incident light applied to a grating type reflector 3 by shifting a position of a lens 2 in the direction orthogonal to the light axis. Col. 3, lines 36-40. There is no disclosure in either Lang et al. or Abe as to how the lens 2 of Abe, utilized for tuning an external mirror type laser, could be utilized in the disclosure of Lang, which already discloses an external cavity, continuously tunable wavelength source. Further, even if Lang et al. and Abe are combined in the manner suggested by the Examiner, neither of such references disclose a collimating lens disposed between the laser source and the diffractive element and a microactuator coupled to the collimating lens for moving the collimating lens to permit enhanced coupling of the light into the laser source as called for in Claim 31. In view of the foregoing, any rejection of Claim 31 under 35 U.S.C. §103(a) should be withdrawn and Claim 31 found allowable.

Claims 32-36 depend from Claim 31 and are patentable for the same reasons as Claim 31 and by reason of the additional limitations called for therein.

Claim 37 is patentable by calling for a tunable laser of the type called for therein having, among other things, a rotatable electrostatic microactuator having a movable structure extending substantially in a plane and coupled to the reflective element for rotating the reflective element about a pivot point extending substantially perpendicular to the plane to select the wavelength of the light. Neither Wu et al. nor McIntyre suggest or disclose a rotatable electrostatic microactuator of the type called for in Claim 37. Nor does Jerman et al. disclose a rotatable electrostatic microactuator, let alone a rotatable electrostatic microactuator having a movable structure extending substantially in a plane and coupled to the reflective element for rotating the reflective element about a pivot point extending substantially perpendicular to the plane. On the contrary, Jerman et al. discloses only linear electrostatic microactuators.

Claims 38-39 and new Claim 40 depend from Claim 37 and are patentable for the same reasons as Claim 37 and by reason of the additional limitations called for therein. For example,

new Claim 40 is additionally patentable by requiring that the pivot point of Claim 37 be spaced apart from and free of the movable structure.

In view of the foregoing, it is respectfully submitted that the claims of record are allowable and that the application should be passed to issue. Should the Examiner believe that the application is not in a condition for allowance and that a telephone interview would help further prosecution of this case, the Examiner is requested to contact the undersigned attorney at the phone number below.

Respectfully submitted,

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